BULLETIN 41

MAINTENANCE TREATMENTS

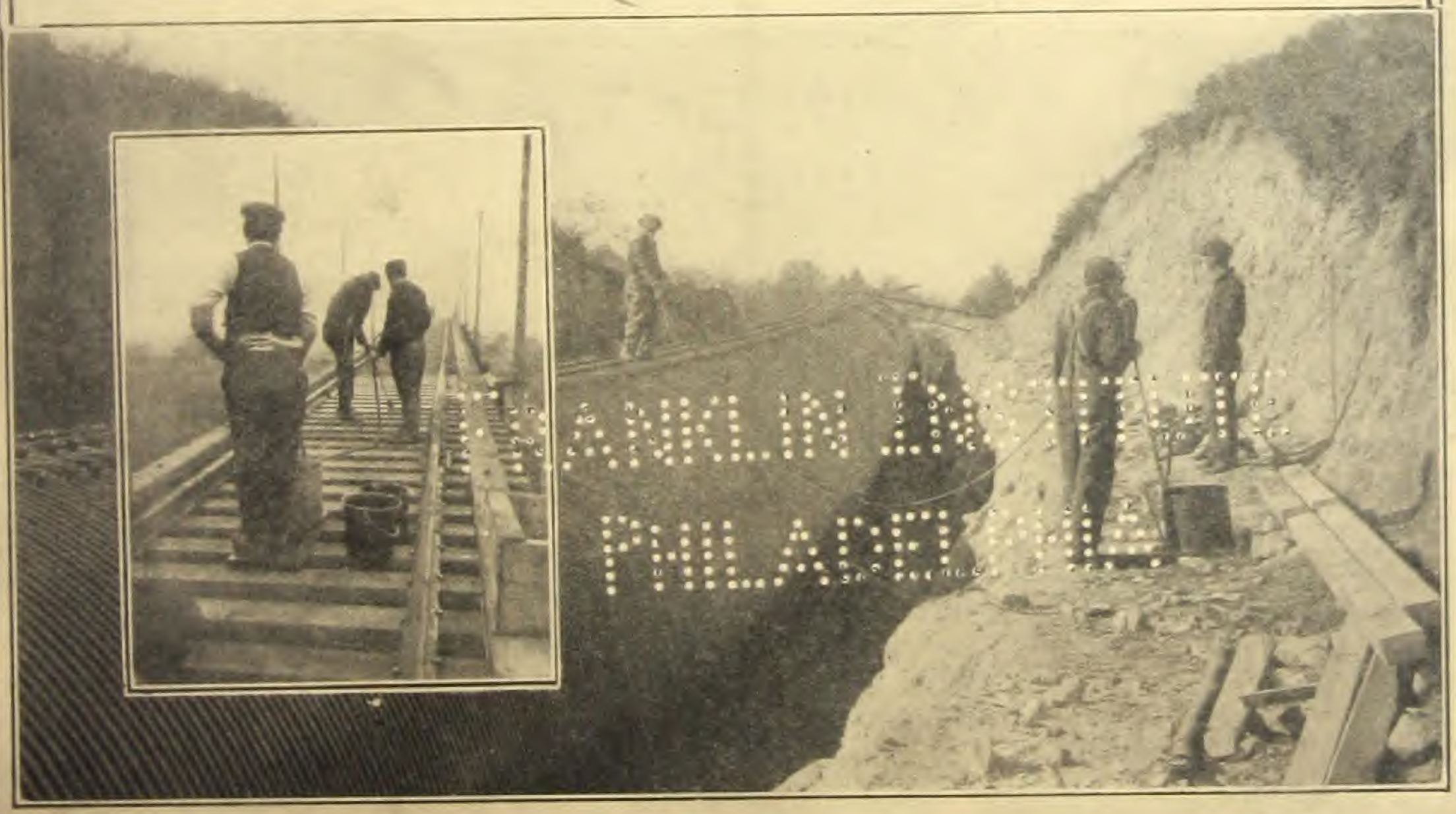
PROTEXOL CORPORATION

SUCCESSOR TO

Carbolineum Wood Preserving Co.

34 BARCLAY STREET NEW YORK, U. S. A.

(1922)



A STITCH IN TIME
SAVES NINE

BULLETIN 41

Maintenance Treatments

By ERNEST F. HARTMAN, Affiliate, Am. Soc. C. E.
Issued 1913, Revised 1918-1922.

Steel is the autocrat of building materials and has been accorded special consideration in comparison with lower costing structural timber. Of the 11-1/5 billion feet of timber annually used in the United States for general building and rough construction about two billion receive some kind of a preservative treatment. Given the same consideration as steel our structural timber would give a much longer life, safer structures and reduce the annual charge very materially. Decay is inevitable. Fire is preventable yet it is insured against. Insurance against decay is *sure* to return a profit. It is an investment where fire insurance is an expense.

Maintaining the soundness of wood means assured safety stresses, a low fire hazard, reduced up-keep charges and a low annual charge. If maintenance means the replacement of worn out parts it also means replacement of the preservative which has evaporated or been washed out of the timber while serving as the antiseptic to prevent infection.

Maintenance treatments are designed to enable the preservative treatment of timber in structures after such timber has dried out and season checked. Since seasoning checks offer the best lodging place for the growth and development of fungus spores some antiseptic treatment should be given after checking has occurred. Necessity compels the use of practically green timber for structural purposes. Such timber must season after erection. To secure the longest life possible from such timber it is essential that maintenance preservative treatments be given.

Prolonging the life of timber in structures means prolonging the life of such structures—maintenance treatments, by adding to the life of timber, therefore offer a distinct economy.

The matter of arresting decay is closely associated with this subject and will be considered later.

The term "surface treatment" was coined by us to designate treatments in which the preservative enters only a relatively shallow zone or casing at the surface of the timber. This is usually accomplished without the assistance of artificial pressure or vacuum. Such treatments differ from painting in that the preservative does not form a skin or film on the outside of the timber but actually enters the cells of the wood, penetrating the cell walls and becoming an integral part of the timber.

The term "maintenance treatment" is new in the wood preserving industry. It might also be termed a "reinforcing treatment". The use of this term does not necessarily indicate that the timber has received an initial preservative treatment. Where, however, timber has received an initial treatment before erection, a maintenance treatment might be termed a "secondary or supplementary treatment".

Maintenance surface treatment of timber in a wooden structure after it has season checked will indefinitely prolong the life of the structure. This on condition that an efficient antiseptic preservative be used and that the method will enable reaching the innermost checks.

Of the three forms of surface treatments, namely, brush, spray and open tank methods, the first two can be used as supplementary treatments.

Secondary Treatments supplementing an initial preservative treatment consist of brush or spray applications to treated timber a year or more after it is erected or placed in service or at stated intervals during the life of a structure. Their object is two-fold, first to close up breaks in the treated zone which may have occurred through the opening up of season checks or from mechanical abrasion and second to reinforce the original treatment and replace such portions of the preservative as may have disappeared through weathering or from other causes.

The use of such treatments is logical and does not necessarily imply inferiority in the original treatment. It merely acknowledges the fact that timber, particularly if not thoroughly seasoned when treated, will season check to a greater or less extent, that mechanical wear or abrasion will occur and that through these agencies breaks in the antiseptic zone will appear. This is true not only of surface treatments but also of heavy pressure creosote treatments.

The improper use of well established terms is misleading. The terms "creosote treatments" and "creosoting" are generally accepted as denoting the treatment of wood with creosote under pressure. These terms cannot justly be used to describe superficial treatments with creosote oil.

In the succeeding discussion it must be assumed that we are dealing with sound timber—timber in which decay has not begun. By this we do not mean sterile

timber because all commercial timber carries upon it to a greater or less extent the spores of wood destroying fungi which are ready to germinate and start the processes of decay as soon as conditions become favorable. These spores may be destroyed by the application of almost any recognized antiseptic or even by kiln drying, but the timber is not necessarily made immune to subsequent infection. Timber kept dry or continually under water will not decay.

As is brought out more fully in the chapter on "Distinction Between Dry and Wet Rot", exposed structural timber is continually subject to infection from fungus spores carried by air, rain water and surface drainage. We must therefore poison the lodging places for these spores if we would prevent their germination and development. Note page 3.

For their growth and development fungi require food, air, a moderate temperature and moisture. If any of these are lacking, the fungus cannot develop. The necessary heat is supplied by almost every climate and it is only in rare cases, as under water or deep under the surface of the ground, that air can be excluded from the timber. Of the four requirements, therefore, two are beyond control. It is only by depriving the fungi of food or moisture that the destruction they cause can be prevented. This is accomplished by surrounding the wood with an unbroken antiseptic surface. It is also well to remember that moisture, besides being a requisite to fungus life, frequently acts as a carrier of fungus spores, especially rain water entering seasoning checks. Maintenance treatments with a permanent antiseptic will give the necessary protection to seasoning checks.

With the food supply poisoned by the antiseptic, decay is impossible since water alone, in the absence of food, is not sufficient for the development of fungus spores. Should any decay exist in the untreated wood below the antiseptic zone, it must receive its water supply through this zone, and the water in passing through the antiseptically treated wood takes up enough poison to render it unfit for the nourishment of the fungus. This poisoned water will destroy the fungus and thus stop the decay. It is only at a break in the treated surface such as a seasoning check that water can bring fungus spores into contact with untreated wood or reach existing fungus growths uncontaminated, thus rendering decay possible.

On the solubility of preservatives see "A Theory on the Mechanism of the Protection of Wood by Preservatives", by Ernest Bateman. (1920)

Breaks in the treated zone offer an excellent place for the lodgment and development of fungus spores. Infection and decay are impossible so long as an unbroken antiseptic zone or shell is maintained.

Depth of penetration is not necessary to give protection against decay. The desire to have as deep a penetration as possible aims at protection for seasoning checks which inevitably occur and provision against improper handling of treated timber or mechanical wear. The depth to which season checks will extend is only limited by the dimension of the timber and it is therefore impossible to provide against them except by complete saturation of the timber which is not only a practical physical impossibility but is also commercially impracticable owing to the cost of such treatment. Other means must therefore be sought to protect timber against the decay which may begin in seasoning checks that will open up in treated timber.

Bearing in mind the distinction between penetration and absorption, the statemcnts previously made regarding maintenance treatments become of more interest. It is one of the cardinal principles of wood preservation that *only an unbroken antiseptic zone of treated timber will prevent decay*. It follows from this that permanency of the antiseptic is of prime importance.

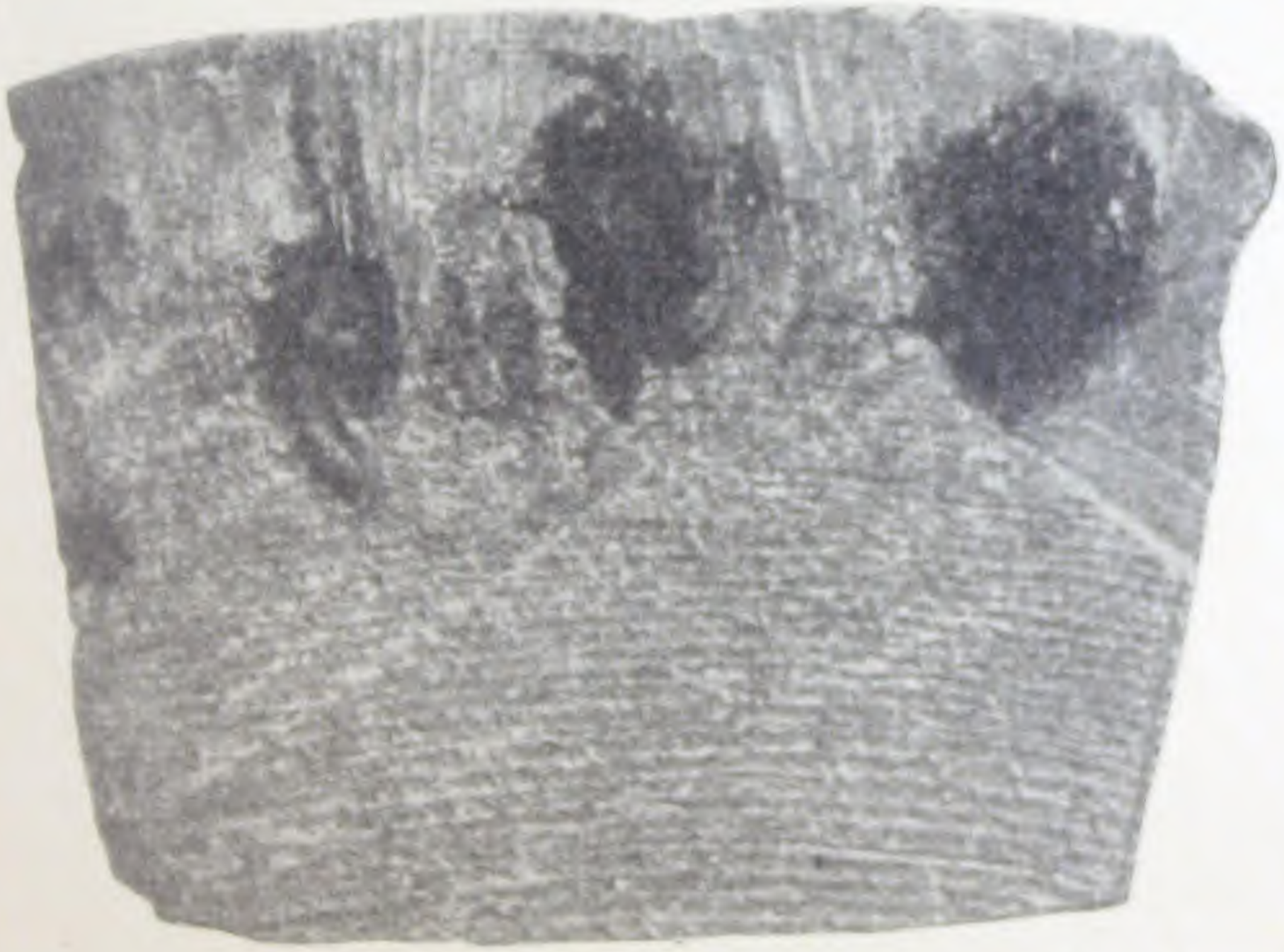
"The record of timbers and piling that were not exposed to mechanical wear indicates that complete penetration is not necessary if the outer protective ring remains unbroken and the ends are likewise protected." This is a statement from the 1916 report of the Committee on Wood Preservation of the American Railway Engineering Association when considering the subject "The relation of the amount of preservative and the depth of penetration to the resistance of the material against decay".

At the 1917 convention of the American Wood Preservers' Association, referring to pressure creosote treatments, the statement was made that "the preservation of timber against decay depends upon the maintenance of an unbroken antiseptic zone rather than on depth of penetration". The statement was made and illustrations were shown to demonstrate this truth by Mr. Geo. E. Rex, Mgr. Treating Plants, Atchison, Topeka & Santa Fe Ry., Topeka, Kans., and Mr. J. H. Waterman, Supt. Timber Preservation, Chicago, Burlington & Quincy R. R., Galesburg, Ill., both Past-Presidents of the Association.

Quoting from another report "The results of this study are believed to confirm the theory that a creosoted pile is absolutely immune from attack of marine borers, * * * so long as the shell or portion of the pile impregnated remains

"Cross-section of an oak railroad tie rotted by one of the sap rot fungi. Note the season crack through which the fungus obtained entrance to the interior."

From Bulletin 149, Bureau of Plant Industry, U. S. Dept. of Agriculture, by Herman von Schrenk and Perley Spaulding, Pathologists.



"Cross-section of timber showing seasoning checks through which fungus spores entered.

The 'dry rot' of this timber was caused by the mycelium of the fungus, originatiog from spores deposited in the seasoning checks shown in the illustration."

From Dr. Robert Hartig's book "Merulius Lacrymans and Other Timber Destroying Fungi".

intact".

On the other hand, the factor of mechanical abrasion is important for ties subject to heavy traffic and wearing floors. In such cases it must not be overlooked in determining depth of penetration necessary to give protection against decay. For most structural timber mechanical wear is practically negligible and so need not enter into consideration here.

Season checks *will* break through the protected area of the original treatment on exposed structural timber—hence the advisability of applying a maintenance or reinforcing treatment to maintain the continuity of this zone.

Maintenance treatments, as heretofore stated, are designed to insure an unbroken antiseptic zone and this being maintained, the depth of the penetration or the amount of preservative absorbed are important only as a means to this end and are not as essential as would appear on first consideration.

The value and importance of an established relation between the amount of preservative and depth of preservative treatment to the resistance of the timber against decay, must obviously be based on the results of service tests with specific preservatives and specific methods of application.

The weaker or more soluble the antiseptic, the more frequent must be the renewal of a supply. This is well illustrated by a crude method which employs the use of salt boxes filled with rock salt on the top of piles in trestles. Every time it rains some of the salt is dissolved and runs down on the outside of the pile, being absorbed by the outer layers of the wood. This method has given good results, but compared with treatments here discussed it is really expensive.

The result established by a continuous service of 46 years confirms the above statement, that an unbroken antiseptic zone can be maintained and the day of replacement indefinitely postponed by the intelligent use of Maintenance Treatments with Protexol preservatives.

Let us suppose that in a certain structure the life of the untreated timber is four years and that by a treatment with Protexol it can be prolonged to eight years. This means then that after eight years the timber will have to be replaced with consequent tie-up in operation, trouble and expense. By the use of a maintenance brush or spray treatment at intervals of say three years the life of this timber can be prolonged not only four years, but indefinitely. The expense and trouble would be less than if ordinary paint were used and the resulting extended life would be immeasurably greater. Such treatments are particularly adapted to exposed platforms, roofs, bridges, trestles, coal plants, marine timbers and boats. In the two last named particularly, supplementary treatments are desirable where salt water enters into consideration since added to the danger of decay is that of marine borers and barnacles. "In treating our steamboat hulls we use a spraying machine and treat the whole interior of the hull, decks, floors, sides, beams, bottoms and all. It generally costs us about $25 for the labor. We aim to treat our boats every four or five years." This statement from an experienced naval architect and old user of Protexol is significant and attests the value of supplementary treatments for boats.

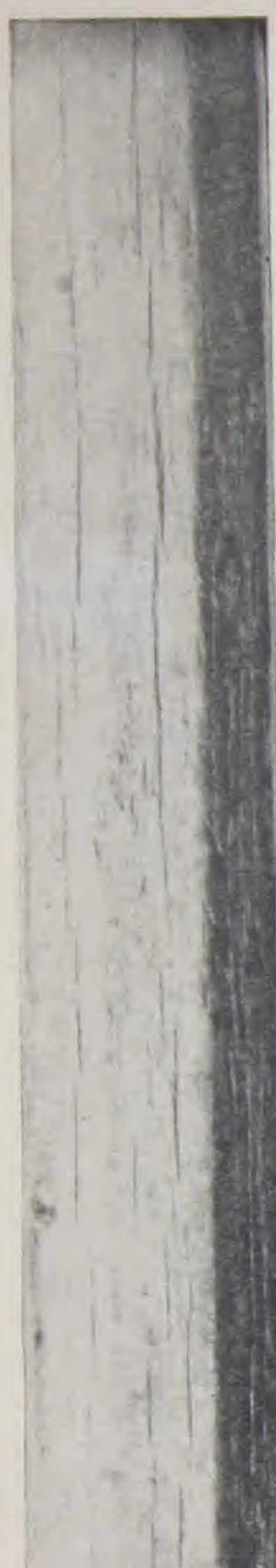
There is another kind of maintenance treatment worth mentioning. The importance of the treatment required for framed creosoted timber on which untreated wood is exposed has received but scant attention. Disastrous and expensive results have followed as was illustrated by Mr. Rex in the lecture already referred to. Creosoting is not infallible and the importance of more carefully selecting the preservative to be used for the brush treatment of framed creosoted timber is beginning to be appreciated by thinking men. The amount the brush will flow upon such surfaces being equal, the greater permanency of Protexol makes its use decidedly preferable to the usual brushing on of creosote oil.

The weakest point in the treated area like the weakest link in a chain will determine the amount of protection afforded against decay.

On exposed structural timber the likelihood of decay is greatest at those points where moisture may collect and not dry out rapidly. This optimum moisture condition found in joints, mortises and other contact surfaces is identical with the conditions prevailing at the ground line of poles. Special care then must be exercised to counteract this moisture condition.

It is not enough that the most of a lot of timber shall resist fungus to secure a safe structure. All of it must be resistant. The safety of a structure is not governed by the number of beams, columns or braces but by the fact that none of them are rotting unnoticed.

The illustration of creosoted ties on an important bridge (page 7) adzed to fit a rail indicates the frequent necessity for a maintenance treatment. All guard rails on this bridge had the ends framed to make joints. A pile of these ends is shown in the inserted photograph which illustrates the extreme variability in the penetration as well as the fact that wherever ends are framed untreated wood is exposed. This is a condition invariably



F. W. IESLS, GENERAL MANAGER
C. S. JINNER, AUDITOR

CODES: WESTERN UNION AND LIEBER
CABLE ADDRESS: PORTELCO, SAN JUAN.

PORTO RICO RAILWAY LIGHT & POWER COMPANY.

SAN JUAN, PORTO RICO August 18, 1913.

Carbolineum Wood Preserving Co.,
New York, N. Y.

Dear Sirs:-

Prior to my coming with this company my predecessor had used your preservative and the octagonal poles which support the trolley wire between San Juan and Santurce had all been treated with two coats before being placed in position, and since that time have received two additional coats. These poles, almost without exception, are in practically perfect condition, although they have been in the ground ten years, and have only been replaced from time to time as it has been necessary for us to put in 35' and 40' poles where the 30' poles had formerly been located. I am sending you one of these poles as this, better than anything I may say, will show you how well the preservative has protected the wood, and if it is sawed into you will find the preservative has permeated the innermost portion of the pole. I might state that the pole which you will receive has not been treated for four years.

Having had twelve years experience in the tropics, in Trinidad, Demerara, Cuba and this place, I have found that your material was the only preservative which would stand the test. Where Comejens already exist, the application of this preservative kills those in the wood and prevents others from attacking the same. As instance of this is our Martin Pena Car Barn.

This building was constructed of native hardwood framework with 1½" hard pine planking covered with galvanized iron. Five years ago this building, upon examination, was found to be so badly eaten up by Comejens that I intended to tear it down, but as I required it for storing cars and could not spare the time to tear it down and replace it, I had the interior given two coats of your preservative, and to my surprise this not only killed the Comejens in the wood, but prevented others from attacking the same, and to-day the building is still standing and in daily use, and a careful examination shows no trace of insect life in the same.

We have eighty box cars, the wood of which instead of being painted has been dipped in the preservative, the result being that these cars to-day are in perfect condition, and have never cost us one cent for painting or treatment.

I might state that we erect no building where the foundation and the under portion of the floor are not treated.

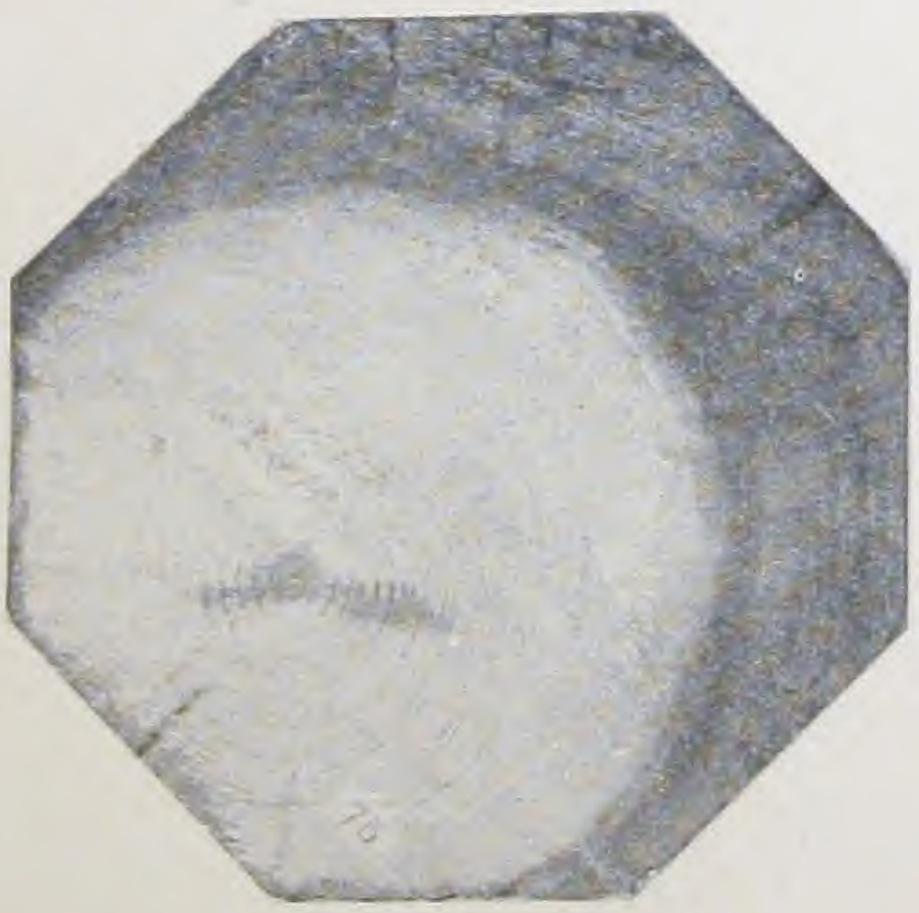
In other words, for the protection of all wood to be used in the tropics, or elsewhere for that matter, I would unhesitatingly state that your wood preservative should be used, as from our experience it seems to be the only thing that will fill the bill.

Yours very truly,
PORTO RICO RAILWAY & LIGHT COMPANY.

F. W. Ieels

General Manager.

FWT:JOL



Note heavy penetration, the result of maintenance treatments.

met with in creosoted wood and is usually more marked in the better than in the poorer grades of timber. Over a thousand gallons of Protexol were used on this bridge for reinforcing pressure creosoted ties. It will be evident that the protection afforded by the brush treatment with Protexol Wood Preservative, will fix the ultimate life of these ties since this treatment is the only protection at the points most susceptible to decay.

Arresting decay may very properly be considered as falling within the subject of this discussion. Rotten wood burns like tinder.

In cases of this kind the decay should be carefully shaved or scraped away and after drying out of the surface two or three heavy hot brush coats or sprayings of Protexol should be applied allowing sufficient time for each coat to be absorbed by the wood. Where the expense is warranted the scraping away of the decay may be followed by the application of a heat treatment. This consists of going over the scraped area with a plumber's torch and brushing the surface so treated with a flexible steel brush before applying Protexol or Protexide.

For arresting decay always use Protexol heated to 200° F. and apply it hot. The thermal effect thus secured materially aids the toxicity of Protexol in the destruction of fungi. Note page 11.

As stated in Circular 59 on General Directions for the Use of Protexol the care exercised in carrying out these instructions will determine the result. It is perhaps nowhere more true than of maintenance treatments that the attention to detail will differentiate success from failure.

Space will not permit a fuller discussion of this subject here. Arresting decay is too serious a matter to be passed over lightly. Correspondence on this subject should be addressed to our Consulting Department.

Still another form of maintenance treatment, but one having a very limited field, consists of applying a preservative under pressure or by simple pouring through holes bored in the timber. Since the absorption of the preservative by the timber under such conditions merely follows the grain of the wood without extending transversely, either the wood becomes treated only in longitudinal streaks or the number of holes necessary to effectively treat the timber becomes so great as to materially weaken it. A modification of this method may be advantageously employed, however. It consists of boring a single ½-inch or 1-inch hole through a timber and terminating in a joint or contact surface. A preservative poured into this hole spreads out between the surfaces in contact successfully treating and preserving them from decay. By closing these holes with removable treated wooden plugs or lag screws the treatment may be renewed from time to time. This method is applicable wherever large timbers come in contact as in trestles, bridges and wharves.

There are conditions under which the use of the brush method (painting) will prove economical.

For either initial or maintenance treatment the spray method manifestly possesses many advantages. It enables the forcing of the preservative into checks, splits or joints which cannot be reached with brushes. It excels the brush on rough timber and vertical surfaces. For description and prices of spray equipments see Leaflet No. 8.

For covering large surfaces it is also considerably cheaper than the brush method. Another distinct advantage is the enabling of more rapid work. Two men will average 20,000 sq. ft. a day and do good work, whereas with a brush, one man will average 3,000 sq. ft. a day. While considered wasteful by some, the use of a larger quantity of the preservative is offset by the saving in the labor charge.

The fine spray easily reaches all season checks where fungus spores may have lodged. Bearing in mind that a four per cent solution of Protexol possesses the necessary toxic strength to inhibit fungus growth, it becomes apparent that a thorough spraying with Protexol heated to increase its penetrability and antiseptic properties will insure an unbroken treated zone.

It becomes evident at once that such a form of treatment should preferably be given at that time of year when the atmospheric conditions cause the checks to open widest—it should never be applied immediately after a rain.

CONCLUSIONS

Proper antiseptic treatment will prevent the decay of wood and it is worth remembering that ninety-five per cent of the deterioration of wood is directly caused by decay.

Season checking cannot be prevented on exposed structural timber. The season checks must therefore be rendered harmless.

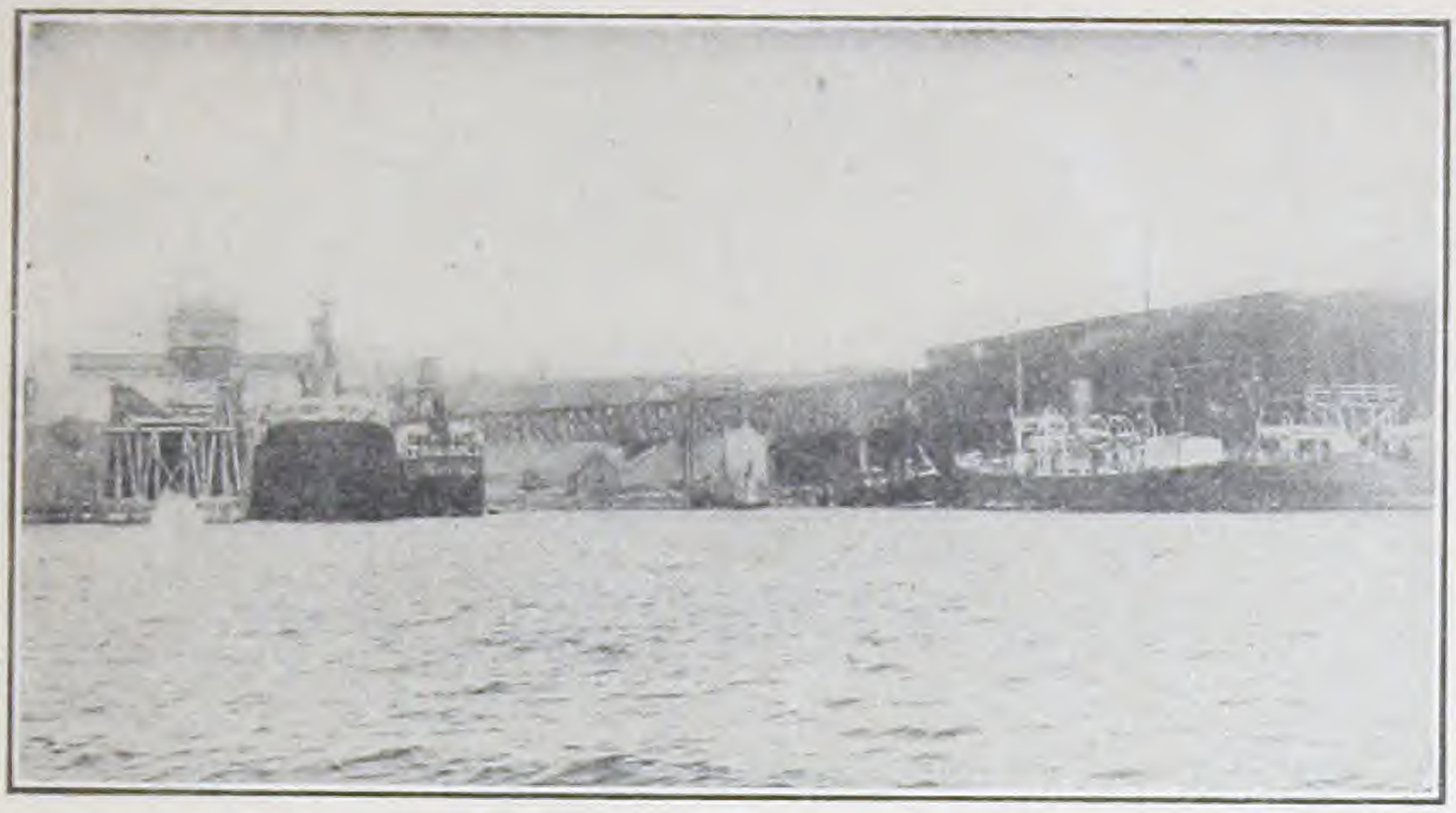
The maintenance of an unbroken antiseptic zone will prevent decay.

Depth of penetration or the amount of preservative absorbed are important only as a means of insuring a continuous protected surface.

Decay on exposed structural timber can be arrested. (CONTINUED ON PAGE 7)

Protexol
WOOD
PRESERVATIVE

PRESERVES WOOD EVERYWHERE



Scotia's Coal and Ore Pier. View from Harbor

We sprayed your preservative on our piers and coal trestle using the spare time of men usually employed around the pier on other service. This would necessarily make the unit cost high, and so far as the company was concerned the work was really done at low cost.

JOHN PRESTON, Mechanical Engineer.
NOVA SCOTIA STEEL & COAL COMPANY

The application of maintenance treatments to timber treated at the time of placing is logical.

Creosoted timber when framed should be reinforced with brush treatments with Protexol.

Protection against decay at the weakest point will fix the life of the timber.

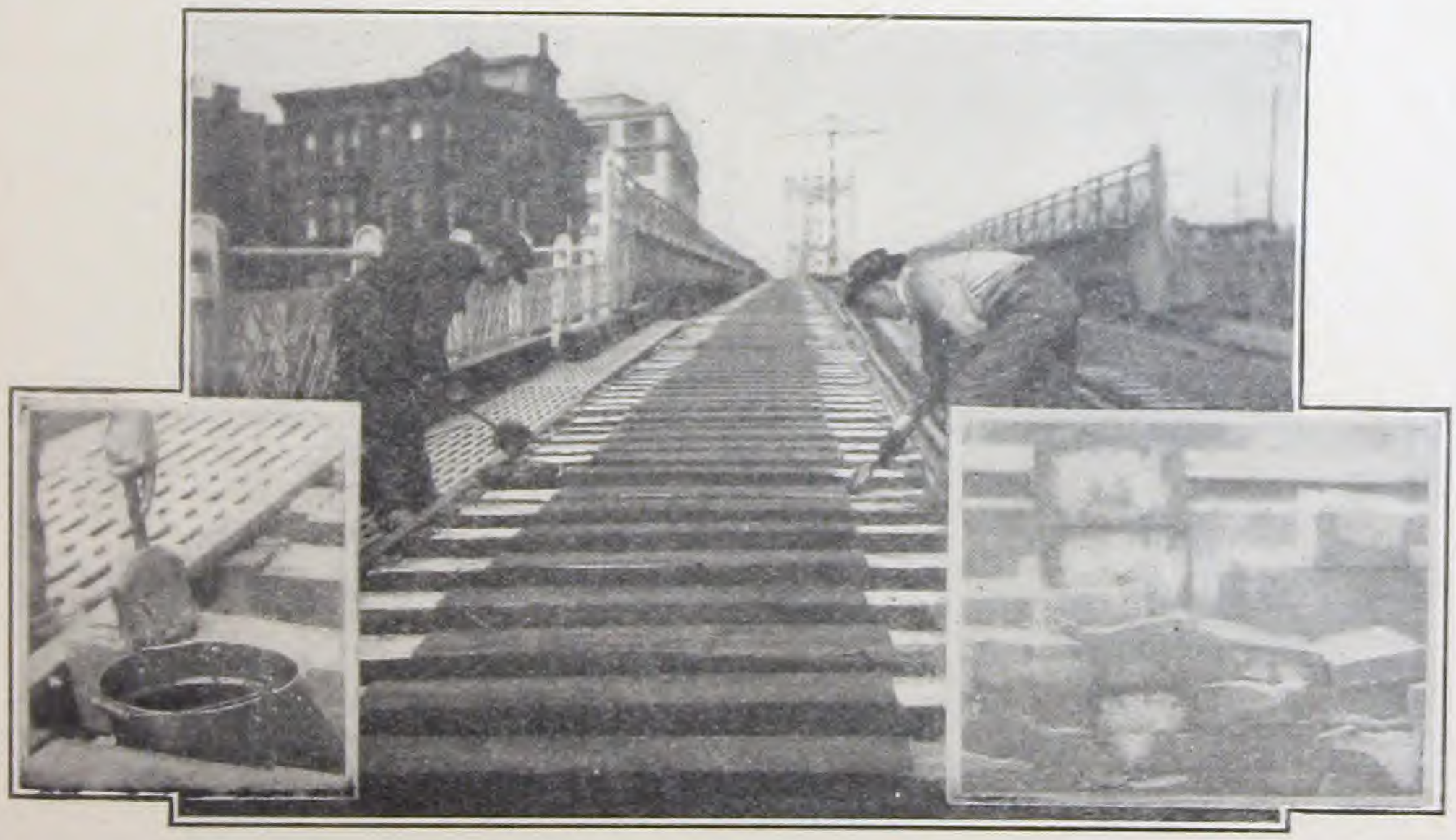
The sprav method of application possesses many advantages for maintenance treatments.

Maintenance treatments applied periodically will indefinitely prolong the life of any wooden structure.

CONCERNING EXPERIENCE.

Surface treatments with Protexol represent a practical experience of forty-six years under varying climatic conditions in all parts of the world. Discriminating engineers have selected this preservative for their most important work.

Because of its especially non-inflammable character and after exhaustive comparative tests with other materials Protexol was selected for the treatment of all timbers for the Hell Gate and other bridges of the New York Connecting Railroad.



For reference and details see last paragraph page 4

Because of its superior insulating qualities it was selected by the Electrical Department of the Michigan Central Railroad for all insulating woodwork used in the Detroit River Tunnel connecting Detroit, Mich. and Windsor, Ontario.

Because of its permanent toxicity in preventing insect attack the Isthmian Canal Commission selected it for the treatment of all lock fender timbers.

All nailing strips for the Pennsylvania Hotel at New York (the world's largest) received a specially designed treatment with Protexol upon the specification of McKim, Mead & White, Architects.

Factors may change as in the cases cited, but no matter what factors are considered or what comparative tests may be made, it is a fact that simple surface treatments with Protexol have demonstrated their permanent wood preserving value.

Circular 60 is on Dry Rot in Timber.

Deterioration of Timber and Its Causes is explained in Circular 68.

Inflammability of Treated Timber is covered in Circular 79 and Leaflet 25.

Circular 89—The "How" of Surface Treatments contains a chart indicating forms of application to meet service conditions.

Bulletin 40 on "The Annual Charge Against Treated Timber" contains formulae and tables adaptable for all general annual charge data.

The trade mark Protexol No. 1 is our designation for the material formerly manufactured and sold by us under another name. The production of standardized wood preservatives constitutes the primary operations at our works at Kenilworth, N. J. Among these is creosote oil, but there are only three grades of wood preserving oils and one standardized colorless preservative that are recommended for surface treatments, i. e., brush, spray or open tank treatments. Descriptions and chemical standards of these will be found on page 12.

That we initiate developments indicates progress. Progress by change.

DISTINCTION BETWEEN DRY ROT AND ORDINARY OR WET ROT.

There are certain timber-destroying fungi which characteristically require a large amount of moisture, and it has to be supplied right on the spot, that is, the stick of timber has to be fairly wet. This is the ordinary wet rot.

There are other wood destroying fungi which produce the so-called dry rot. Of these the "Merulius Lacrymans" (the Weeping Lacrymans) is a good example. These fungi will not grow in the entire absence of moisture, but their moisture requirement is very small. A characteristic of these is that they send out over the wood great long strings or strands sometimes 30 to 40 feet long and at times as thick as a finger. They are made up of masses of hyphae. The peculiarity of these fungi is that these long strands will pass from a region of plenty of moisture through a region where there is little moisture, thus the fruiting body will be getting its moisture supply from a source outside of the zone of decomposition. The strands will sometimes start in the basement of a building and run up through the walls or partitions, and the active growth of the fungi may be 10, 20 or even 30 feet away from the source of moisture, which is conducted all that distance by the strands. The thermal death point of dry rot fungus is said to be below 100° F.

A single pore of a fungus may shed more than enough spores to place one on every square inch of space of 10,000 square feet. These spores are very adhesive. A study of the source and modes of infection has taught us the latency of timber destroying fungi. Though they may dry up for many months, they will proceed to shed spores on again being moistened, some spores reviving even after four years. Mycelium revives even after the sporophores no longer respond.

DISTINCTION BETWEEN PENETRATION AND ABSORPTION.

Penetration is a measure of the depth to which a preservative fluid enters into a piece of timber. It is therefore a measure of distribution and takes no account of the amount of preservative required to reach the designated depth.

Absorption is a measure of the amount of the preservative fluid which is taken up by a stick of timber. It is usually expressed in pounds of preservative per cubic foot of timber, and no account is taken of the distribution of the preservative. In order, therefore, to get a complete idea of the thoroughness of any treatment, it is essential to know both the penetration and the absorption, or in other words, to know the depth to which the preservative has entered the wood on the one hand, and on the other the amount of the preservative which has been taken up. With a so-called Full-Cell Treatment penetration and absorption will vary directly, but if any means are taken to cause a particularly wide distribution of the preservative, then the penetration may be much greater than would be ordinarily expected from the amount of preservative absorbed.

Specifying treatment according to Surface Area is a sounder basis for wood preserving specifications.

GREAT LAKES
DREDGE & DOCK COMPANY

RIVER & HARBOR IMPROVEMENTS

FOUNDATIONS, BRIDGES, PIERS, BREAKWATERS, LIGHTHOUSES
TUNNELS, PNEUMATIC AND SUB-MARINE WORK

CHICAGO. MONROE BUILDING | BUFFALO N.Y. | CLEVELAND. WILLIAMSON BUILDING | DULUTH. ALWORTH BUILDING | AMHERSTBURG ONTARIO CANADA | SAULT STE MARIE ADAMS BUILDING | BOSTON.

CHICAGO February 23, 1914.

Carbolineum Wood Preserving Co.,
New York, N. Y.

Gentlemen:

Replying to your letter of January 26th which was addressed to our Chicago office, will say that we used one of your barrel spraying machines to spray some coal pockets at Lime Island which we erected for the Pittsburgh Coal Co. of Pittsburgh, Pa.

We can say that we got very good results from this method of using your wood preserver. It was heated to about 150 degrees and flowed very freely from nozzle of spray and your special hose was not affected in any way.

It would be hard to tell what percentage of preservative was wasted, as it varied with the force that the wind was blowing as this work was all outside.

We figure that it penetrated in checks that were in the wood faster and better than by brush method.

We cannot state at this time just the amount of the preservative that was used. All timber in work was 6 x 12 and 12 x 12 Fir timber. While we cannot give you number of square feet covered by it, our total cost for labor amounted to $500.00, this for two sprayings, and we figure that we saved one-half of the labor cost by using the spray.

Yours truly,

GREAT LAKES DREDGE & DOCK CO.

THM/MD PER T H Mackie

PACIFIC COAST PIPE CO.

MANUFACTURERS OF

MACHINE WIRE WOUND AND CONTINUOUS STAVE

WOOD PIPE

P. B. GARRISON, Pres. and Gen. Mgr.

TELEPHONE BALLARD 646

6315 14th Ave. N.W.

FACTORY AND OFFICE, BALLARD STATION SEATTLE, WASH.

ALTMAR, N. Y. Jan. 31, 1914.

Carbolineum Wood Preserving Co.,
New York City.

Gentlemen:

In answer to yours of the 26th. We applied over thirty barrels of your preserving oil by the spraying method to the penstock, as shown by photograph, for the Ontario Power Company upon specification of Mr. V. G. Converse, Chief Engineer. This penstock was erected near Altmar, N. Y. of Douglas Fir.

To answer your questions:

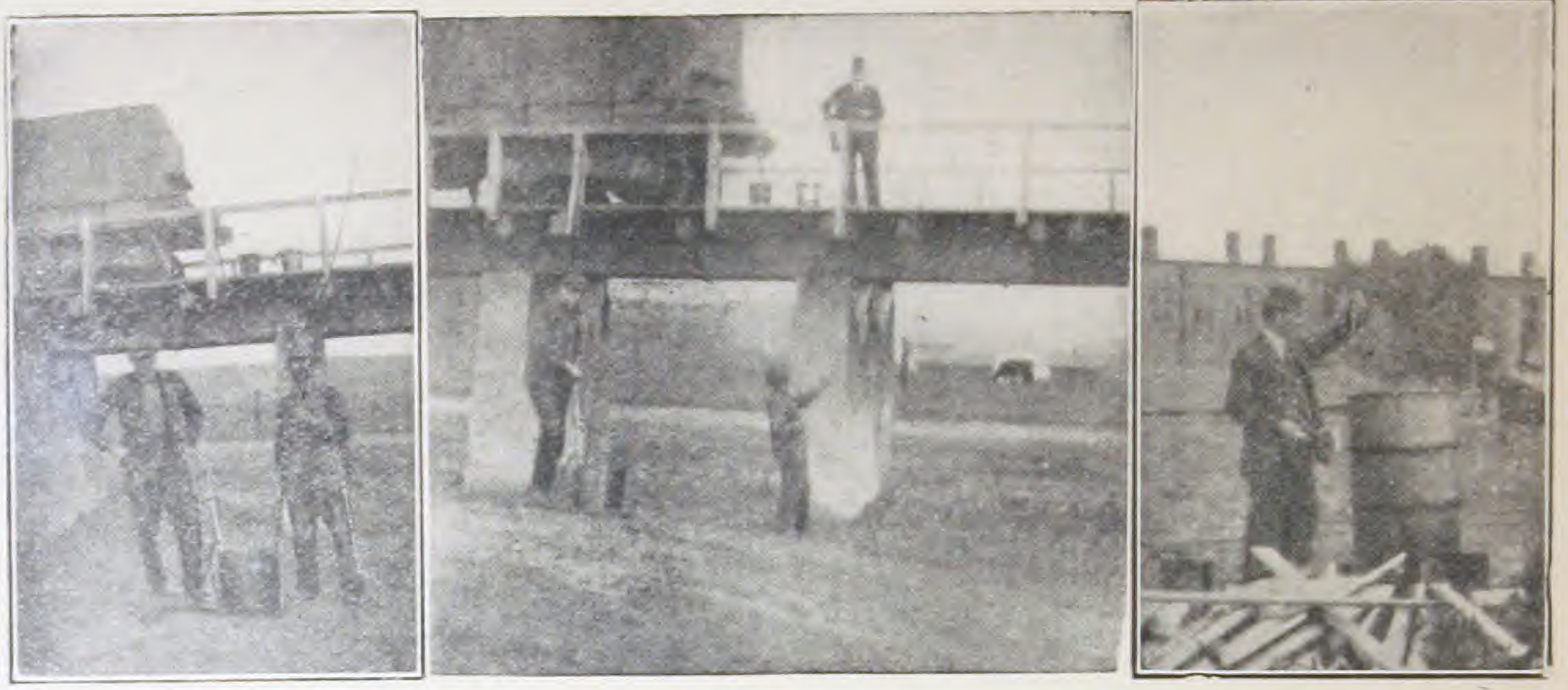
1. Was the preservative heated? If so, what temperature?
   Ans. The preservative was heated to 150° - 180° F.
2. Did it flow freely through the nozzle of spray?
   Ans. It did flow freely through the nozzle.
3. Did the hose seem affected by the heated preservative?
   Ans. Hose was slightly affected after using all fall.
4. What percent of the preservative was wasted?
   Ans. No good data on this.
5. Were you better able to reach seasoning checks or joints than would have been possible with the brush method?
   Ans. Yes.
6. What was the covering capacity of one gallon?
   Ans. 100 sq. feet.
7. What kind and quality of timber was treated?
   Ans. Douglas Fir timber.
8. How many square feet were covered by two men per day? This to compare labor cost with the brush method.
   Ans. Used 6 men, heating, carrying and spraying - Covered 15,000 sq. feet with 150 gallons.
9. Was treatment satisfactory and do you consider it successful?
   Ans. Yes.

In the West we have used considerable of your material on wooden pipes. We specify and recommend your preservative regularly as it has proven very effective in all our work.

Yours truly,

PACIFIC COAST PIPE CO

By R B Fulton
AGENT



COST FIGURES, MATERIAL AND EQUIPMENT.

101 Gallons Protexol at 80c	$80.80	
1 Heating Tank	5.00	
1 Spraying Outfit	20.00	
30 feet Special Hose at 31c	9.30	
1 Thermometer C. W. P. Co., Standard	1.50	
1 Dipper	.75	
1 Goggles	.25	
2 Buckets	20	
Total Cost	$117.80	
Return value of Empty Tank	4.50	
Net Cost	$113.30	

All accessories necessary furnished by us. Complete list in Leaflet 8.

Labor Cost:—Not possible to estimate, the work being done by yard men when not otherwise employed.

Cost per sq. ft. $.0069.

Cost per M. ft. B. M. $4.134.

Carbolineum Wood Preserving Co.,

New York, N. Y.

Dear Sirs:-

To answer your question whether the spraying outfit better enabled reaching all seasoning checks than would have been possible by brushing would say that we consider that the treatment was thoroughly successful and we were enabled to reach points which we could not have gotten at with a brush.

As regards waste I have nothing definite to go by but certainly the waste was not above 20% and I do not think that this was bad for open trestle work. We had no trouble in applying the heated preservative through the hose and you will recall that you recommended our applying it at 180° F.

As shown on photographs sent you the men wore goggles and this I consider is a wise thing to do. The color of your material should most certainly prove satisfactory for the outside of any coal structure.

The trestle is 216 ft. long and the tracks are supported by six 8 x 16 stringers which run the entire length of the trestle on 19 cement piers. There are 171 railroad ties in the trestle and the whole structure is covered with a flooring of 2½ inch planks, the trestle being 15 ft. wide. This makes a total of 16449 square feet of surface which required the use of 101 gallons, thus the covering capacity of your wood preserver was fully 200 square feet per gallon after making proper allowance for the waste.

This I trust will give you sufficient details and as already stated I consider the treatment was thoroughly successful.

Very truly yours,

W G Morton.

Federal Telephone & Telegraph Co.

EXECUTIVE OFFICES: 332 ELLICOTT STREET

BUFFALO, N.Y.

February 6, 1913.

Carbolineum Wood Preserving Co.,
New York City.

Dear Sirs:-

Our experience with your wood preserver under the most trying conditions on partly decayed poles has been very satisfactory.

Here in Buffalo we have a line of 60' poles about 4 miles long put up in 1902. In 1906 they began to show decay at the ground line. In opening them up to see what condition the pole was in, I found they were decaying down from 12" to 18", into the sapwood about an inch. These poles are very expensive, they cost $25.00 F.O.B. cars Buffalo. It behooved us to try to get something to protect them. We looked around for wood preservatives and found quite a number of different kinds but finally decided to use your material. We got a barrel of it and treated about 15 poles by digging the pole out about 2' down from the surface, scraping all the decayed wood off and used heat to drive the moisture out, then applied your preserver boiling hot with wire brushes, the best we could. Afterward we wrapped these poles with common roofing tar paper and bound it tight, so as to keep the water from getting in between the paper and the pole, then coated the paper on the outside with common tar, that was in 1908.

Two years later, we found some more of the poles in this line showing decay at the ground line and treated them in the same way, but in place of using tar paper used concrete held by wires from about 2' under the surface to at least 6" above the surface.

In the fall of 1912, we opened several of these poles to see what they looked like, and found the poles in a perfect condition, like they were when we treated them, that is, there was no sign of decay whatever, the poles were as clean and solid as the day we put your preserver on. The enclosed photographs well illustrate the sound condition of the poles. Before this we had no faith in any kind of wood preservatives, but now I believe your wood preserver is a good thing for preserving wood of any kind that is to be buried or comes in contact with the earth, and can cheerfully recommend it.

Yours very truly,

FEDERAL TELEPHONE & TELEGRAPH COMPANY.

L:B

C.H. Lamme

Supt. Construction.

163
[illegible]

J. G. INMSEN.
[illegible]

NEW YORK TELEPHONE COMPANY

FEDERAL DIVISION

332 ELLICOTT STREET

BUFFALO, N. Y. May 2nd 1918

The Carbolineum Wood Preserving Co.,
54 Greene St.,
New York, N. Y.

Gentlemen:

In answer to your letters of Apr. 11 and May 1, 1918, the only statement I can add to Mr. Lamme's letter of Feb. 6, 1913, is that the poles he describes are still in exactly the same condition, as they were at the time he wrote you.

Protexol is without question, the best preserver for telephone poles that I have had anything to do with in twenty-five years of experience.

Yours very truly

C. H. Peterson

TECHNICAL DESCRIPTIONS

PROTEXOL WOOD PRESERVATIVE NO. 1.—A non-volatile, heavy oil derived from the highest boiling distillate of coal tar. Its constituents belong to the anthracene group, the permanent antiseptic properties of which are generally acknowledged. After filtration and refining the oil is chemically treated to improve its character and to increase its efficiency. Made to the 46-year-old standard of quality for all general surface treatments. For protecting timber against premature decay this grade is recommended as the very best preservative—specifically where only brush or spray treatments are to be given. Where inflammability of the treated timber is the important factor, we unreservedly recommend the use of Protexol Wood Preservative No. 1.

PROTEXOL WOOD PRESERVATIVE NO. 2.—A straight run anthracene oil to meet the chemical standard for what is known as the carbolineum type of oil. Whenever the higher cost of Protexol No. 1 does not appear justifiable either owing to construction requiring a heavier open tank treatment; because the construction is not of a permanent character or for other sound reasons, Protexol No. 2 is recommended. Where waterproofing is the prime object sought to be attained Protexol Wood Preservative No. 2 is suggested.

NEOSOTE WOOD PRESERVATIVE NO 1.—A mixture of the lighter anthracene oils obtained in redistilling to produce Protexol Wood Preservatives and heavy creosote oils. Liquid at all temperatures. Neosote No. 1 is recommended for heavy open tank treatments where depth of penetration only is considered the measure of preservation or as a temporary preservative agent, or where the only object in using any preservative is high initial toxicity to destroy organisms on timber placed under conditions where decay is not likely if sound timber is used. Where the lowest cost compatible with a satisfactory return on the investment is sought, we advise Neosote No. 1.

NOTES.—It is worth bearing in mind that the item of labor cost will be substantially the same in the application of any one of the three grades. Equipment cost will likewise be substantially the same except where heavy open tank treatments are desired.

Protexol No. 2 and Neosote are more volatile, and their use is not expected to insure the factor of safety to be had from the use of Protexol No. 1, except that a larger quantity of Protexol No. 2 and Neosote will probably give the same results as a smaller quantity of Protexol No. 1.

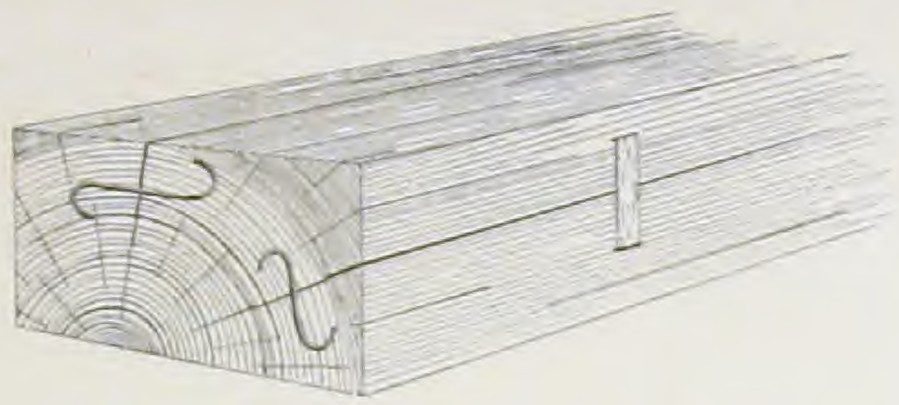
PROTEXIDE.—A colorless and odorless wood preservative. A metallic salt preparation combining high toxicity with low solubility. Non-corrosive. Applied in an aqueous solution of 3 to 5%. Especially suitable where treated surfaces require the subsequent application of varnish or decorative paint or for woods with low absorbing qualities. Especially prepared for surface treatments.

CHEMICAL STANDARDS

When Analyzed in Accordance with Standardized Methods of Analysis (1922).

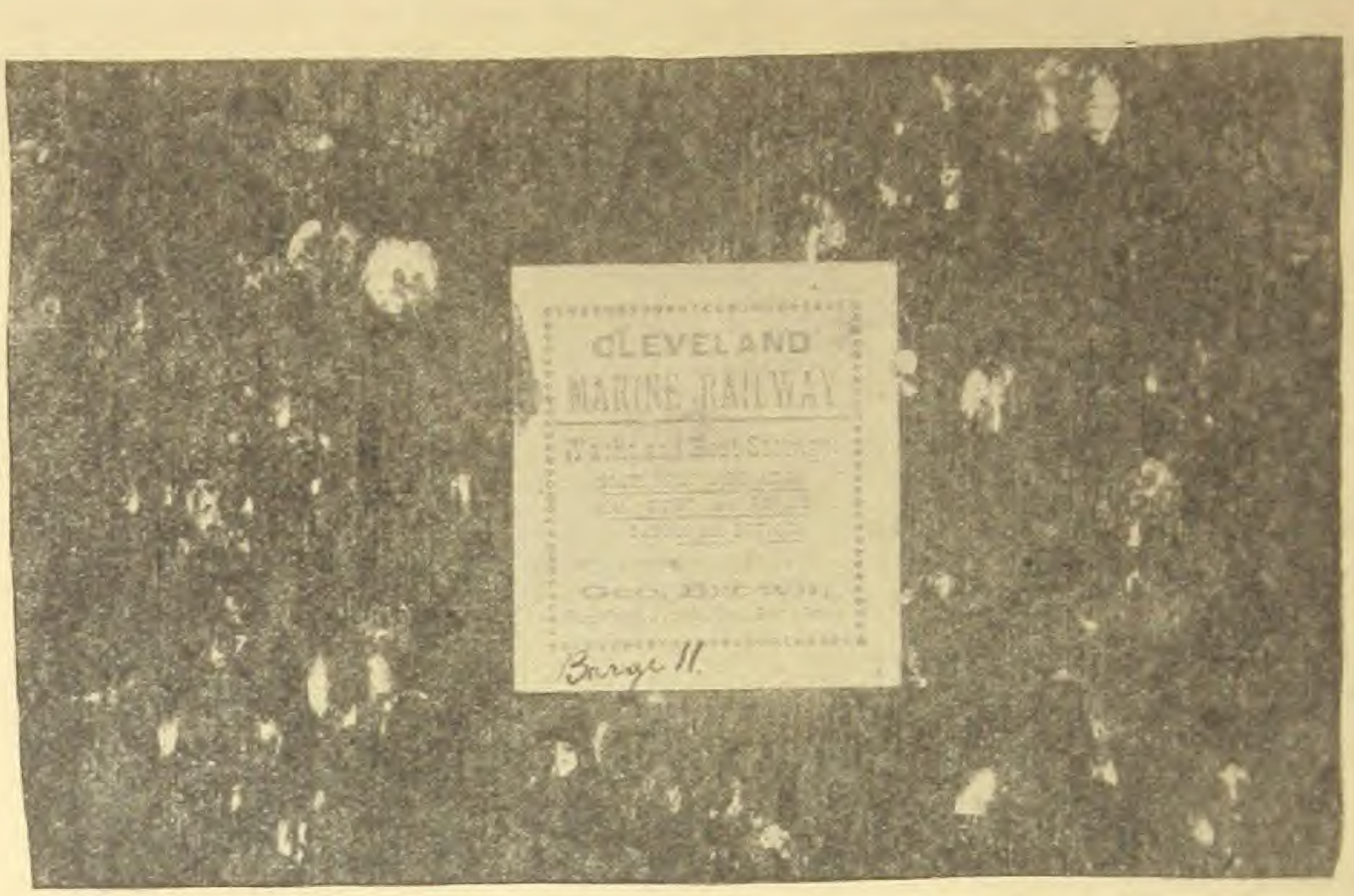
	PROTEXOL NO. 1	PROTEXOL NO. 2	NEOSOTE NO. 1
Liquid at	21°C.	38°C.	38°C.
Specific Gravity at 38°C.	1.10 minimum	1.09 minimum	1.08 minimum
	1.115 maximum	1.13 maximum	
Flashing Point	140°C. minimum	120°C. minimum	
Burning Point	170°C. minimum	165°C. minimum	
Distillate up to:			
210°C.			1% maximum
235°C.		2½% maximum	10% maximum
250°C.	2% maximum		
235-300°C.		20% maximum	
250-300°C.	15% maximum		
300°C.			35% maximum
300-355°C.	35% minimum		
	60% maximum		
Residue above 355°C.	50% maximum		
Float Test on Residue if it exceeds 35%	25 Sec. at 70°C.		
	maximum		
Residue above 360°C.		35% maximum	
Character of Residue		Soft at 20°C.	
Color of all distillation fractions	Red brown		
Tar acids, % of distillate	10% maximum		
Tar acids by volume of the entire sample		2.0% maximum	
Sulphonation residue		0.25 c.c. maximum	
Insoluble in Benzol (by weight).	0.25% maximum	0.25% maximum	5% maximum
Viscosity (Engler)	10. minimum		
Chlorine Test (Qualitative)	On distillate 330-355° by ignition with lime		
Water	None		2% maximum
Color—thin film	Red brown		
Ash left on ignition		1.0% maximum	
Coke Residue	2% maximum		

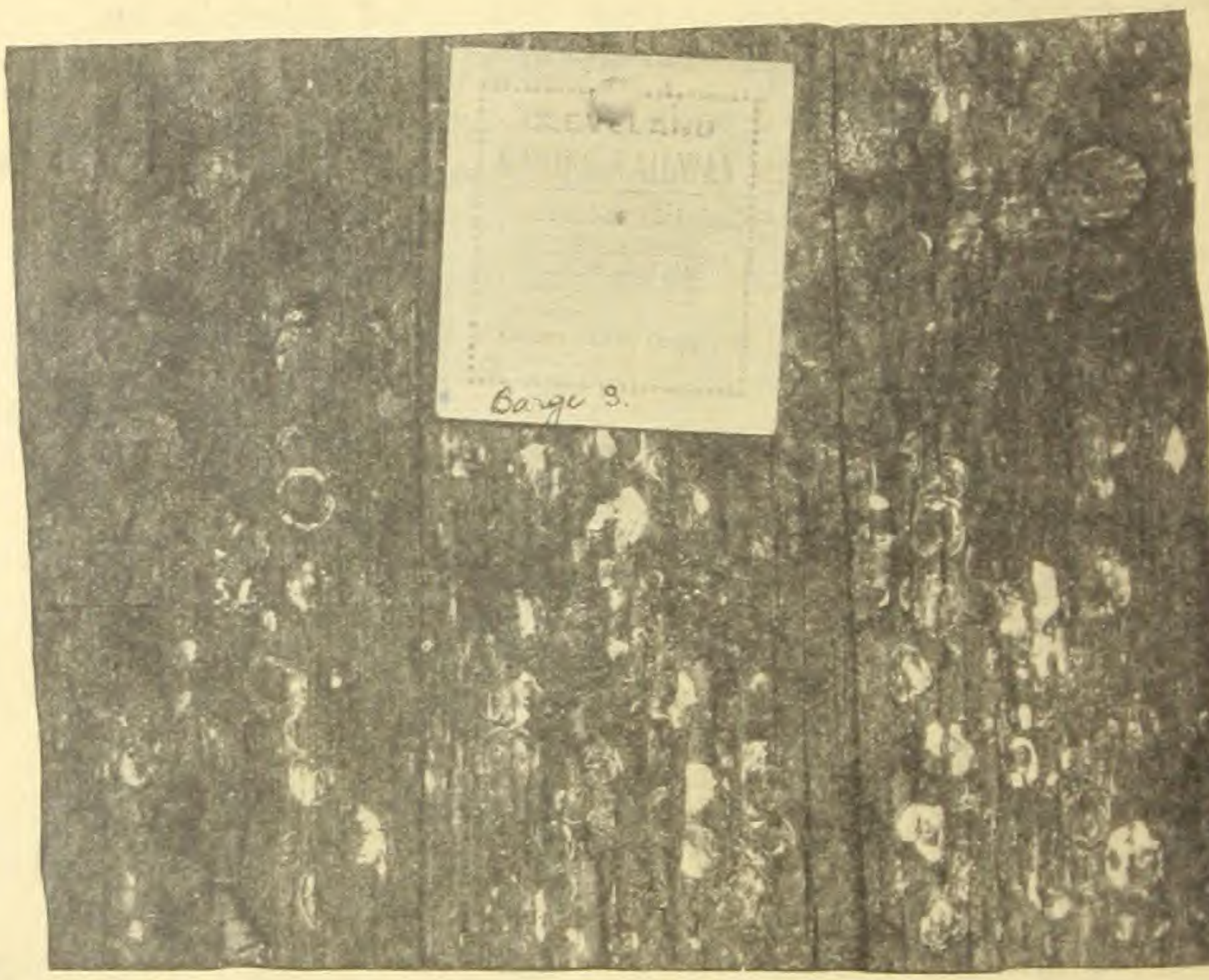
WARRANTY.—The quality of all Protexol Products is warranted to be in accordance with the chemical specifications or representations in all respects. This warranty (adopted in 1906) shall survive acceptance of shipment from the carrier. We agree to bear the cost of inspecting material rejected under this warranty.



SURFACE TREATMENTS

Bearing in mind that nearly half the consumption of wood is in rural districts it will be evident at once that brush, spray and open tank treatments are desirable for a very large proportion of our total wood consumption. Add to this the requirements of many and varied industries for construction timber, and it will become evident that surface treatments are designed to best serve most economically the requirements of a very large and important proportion of wood users, whose aggregate consumption is probably close to two-thirds of the total volume of wood used. Construction timber, flooring, poles, posts, cross-arms or lumber can be very effectively protected against decay by surface treatments. The desire to secure effective treatment for structural timber after framing at the point of construction also frequently determines the advantages of the open tank method. By a proper regulation of the time and temperature of the preservative bath or baths this method is equally effective for green or seasoned timber. The determination of these factors requires a proper understanding of the kind and quality of timber to be treated and the condition of its subsequent exposure. The knowledge and experience gained in our many years of research work are available to all users of Protexol Products. Surface treatments because of their flexibility make available to anyone the benefits and economies to be secured from the preservative treatment of timber.





These specimens of sheathing taken from Barges No. 3 and No. 11 belonging to the Peace River Phosphate Mining Co. were sent to us through the courtesy of Mr. Geo. Brown of the Cleveland Marine Railway at Cleveland, Fla. The value of supplementary treatments is certainly demonstrated and reflected in the penetration on the lower picture. Mr. Brown writes: "Barge 3 was built by Mr. Westeman of Savannah, Ga., in 1891, Barge 11 having been built by the writer in the same year. Both barges were sheathed and coated with tar. In 1893 Barge 3 was hauled up on the railway for repairs. The sheathing was so badly decayed that we decided to put in a new bottom and new sheathing which were painted with two coats of your wood preserver applied hot on edges and on the outside.

The samples sent you were pieces of the sheathing from the bottom of the barge which has been on her since 1893.

In September of the same year Barge 11 was hauled up, the sheathing taken off and we found all the fastenings eaten away. The same treatment was applied as on Barge 3. These barges have been in my care for fully 19 years and when we haul them out we give them one coat of your preserver. Specimen 83 from Barge 3 was split open to show penetration on pitchy yellow pine. The above is a correct record from books of yard where barges are repaired."